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# **Teacher Technology Competencies**

Developed by the  
**Teacher Technology Competency Committee**

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The University of Texas at Austin College of Education  
Austin Independent School District  
Education Service Center Region XIII  
Leander Independent School District

## **Contributing Organization:**

Dallas Independent School District

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## **Teacher Technology Competencies**

As the twenty-first century approaches, the literate citizen is increasingly expected to use computer technology to access and manipulate information. Knowing how to manage electronic information from an ever-widening array of resources and in proliferating formats is essential. To be fully prepared to function productively in a technology-oriented society, students must develop not only fundamental computer skills but also proficiency in using a variety of technology tools to solve problems, make informed decisions, and generate new knowledge. The development of these skills, as in other basic areas of knowledge, is the responsibility of the schools and their instructional staff.

To ensure that teachers are prepared for this challenge, the College of Education at the University of Texas at Austin, in collaboration with the Austin Independent School District, established a task force to study the need for a technology component in pre-service and in-service teacher training programs. This unique task force, known as the Teacher Technology Competency Committee, brought together the expertise of a university, several school districts, and a regional educational service center in developing a set of technology competency standards for current and future teachers. In addition to the College of Education and AISD, the other members of the committee included Region Service Center XIII, Dallas ISD, and Leander ISD. The standards are designed to support and advance the long-range technology plan of the State Board of Education and are now a cornerstone of the College of Education's teacher preparation program as well as AISD's professional development plan for instructional staff and administrators.

### **What are the Teacher Technology Competencies?**

The Teacher Technology Competencies are a set of technology standards that define proficiency in using computer technology in the classroom. The competencies consist of computer-related skills grouped into four general domains: (1) Basic Technology Operation, (2) Personal and Professional Use of Technology Tools, (3) Social, Ethical, and Human Issues, and (4) Application of Technology in Instruction. Each domain consists of a subset of specific skills; these are sequenced from simple to complex so that mastery of the skills is cumulative.

Fundamental skills come first — like managing electronic files, using computerized databases and spreadsheets, sending and receiving e-mail messages, and creating documents with graphics. These skills are prerequisites for more advanced skills, such as accessing on-line resources, creating desktop publishing documents, developing multimedia presentations, selecting and customizing instructional software to fit students' needs, streamlining record-keeping and other administrative procedures with electronic tools, and observing the correct protocols in sharing intellectual property.

### **Why is it so important for teachers to know about computers?**

Research tells us that the single most important factor in determining the success of technology in the classroom is a teacher who is comfortable with and knowledgeable about computers. Yet many teachers, especially those who entered the teaching profession before technology assumed such a pervasive role in society, have had little or no special training in computers. Even teachers who can demonstrate basic computer literacy are unlikely to be familiar with the full range of tools that technology can offer, from spreadsheets to digital graphics to instructional software.

## **Kids already seem to get the hang of computers faster than adults. Won't they pick up computer skills on their own if they just have access to the right hardware and software?**

It's true that most children take to computers quickly because they've grown up in an electronic age. But being a wizard at playing computer games or cruising the Internet isn't the same as possessing the sophisticated technical skills that will be needed in the highly computerized workplace of the future. To develop these skills, students must be able to use computers to collect data, solve problems, make decisions, share ideas, and manage and present information — all with an understanding of the real-world application of these activities. Such abilities are rarely intuitive; they must be fostered by teachers who appreciate the value of technology in the classroom and can provide guidance in using these tools productively.

## **Why do all teachers need these competencies?**

Just as technology pervades all walks of life and almost every field of human endeavor, technology skills are becoming essential in all subject areas because the computer is now the universal vehicle for the acquisition and dissemination of information in all fields. What's more, technology belongs throughout the entire curriculum because of its extraordinary potential for enhancing learning. The learning process becomes active instead of passive because students control their own learning: they must think about and interact with what is on the computer screen. Since computers can radically expand information access and communication, they especially benefit students with disabilities by increasing their participation in the learning process. Just as other professionals utilize specific technologies as tools to enhance their work, teachers must likewise become adept in putting technology to use as the field of educational software evolves with the various academic disciplines. Regardless of grade level or subject, technology can support teachers in numerous professional activities — first and foremost in stimulating learning in the classroom but also in simplifying their administrative duties, improving personal productivity, and advancing professional growth.

## **How do teachers acquire the knowledge and skills that are specified in the Teacher Technology Competencies?**

Technology itself is an interactive medium for manipulating our world, so the process of acquiring the technology competencies must necessarily involve ample hands-on practice, access to a wide range of tools, and, most important, an opportunity to discover the impressive possibilities of technology.

(A Pre-service Example)

At the pre-service level, the competencies are taught in a required course as part of the teacher preparation program in the UT-Austin College of Education. This lab course is reinforced in the methods courses, where professors apply instructional technology in the various subject areas to demonstrate the integration of technology in the classroom.

(A District Example)

At the in-service level, teachers have multiple opportunities for obtaining technology competence. They can attend training sessions offered through Austin ISD's professional development program, work with a mentor, design a self-study plan, or pursue a combination of these approaches. They can also visit model classrooms throughout the district where teachers have successfully merged technology with more traditional modes of instruction. This framework of flexible and varied training strategies accommodates each individual teacher's needs and learning style; yet the way in which the skills are precisely defined and cumulatively structured guarantees consistency across training formats.

## **What is technology integration and how is it fostered by the Teacher Technology Competencies?**

Technology integration refers to the use of a wide range of technology tools across a broad spectrum of relevant and meaningful contexts. Although it must begin with fundamental computer skills, it includes any technology application that enhances creativity, decision making, problem solving, collaboration, and overall productivity in the learning process.

In a learning environment where technology is truly integrated and not an adjunct, students and teachers use technology tools to enhance all areas of the teaching and learning process. For example, with computers students can access, organize, and analyze a vast world of rich resources — whether downloading original source documents from the Library of Congress or taking a virtual tour of a

museum. Students on different campuses can collaborate on projects, sharing and accommodating their diverse perspectives. They can participate in original research projects that put them in touch with actual researchers in the field, and they can receive electronic mentoring from noted experts around the world. Technology gives students powerful tools for communicating what they have learned, motivating them to learn more.

Effectively managing a classroom where students engage in these activities in a manner that improves academic achievement requires a teacher with expertise in the sophisticated and increasingly complex field of instructional technology. The Teacher Technology Competencies are designed to give teachers this expertise to select and use the technological resources that not only meet students' learning needs but also equip them with appropriate skills for the future.

### **Since technology changes so fast, won't these competencies be outdated in a year or two?**

In formulating this set of standards, the Teacher Technology Competency Committee has established a concurrent process for reviewing and validating the competencies. As the affiliated institutions incorporate the competencies into their respective training programs, the Committee will periodically evaluate and refine specific elements of the competencies to ensure that they are not only congruent with the ever-changing shape of technology but also effective in achieving the desired training outcomes. The modular design of the competencies makes it easy to revise the components and performance criteria within a domain to reflect technological advances in specific areas as well as students' learning needs. Periodic updating of the competencies, with corresponding adjustments in the teacher preparation and professional development programs, will keep teachers abreast of the most recent developments in educational technology. Most important, the organic structure of the competencies and their action-based orientation will encourage teachers to make technology tools an integral part of all their professional activities.

### **How do teachers know they have mastered the competencies?**

Mastery of the Teacher Technology Competencies is demonstrated entirely by performance-based assessments. These involve satisfactory completion of a series of tasks that give evidence of proficiency in each skill. Teacher candidates are assessed in the first three domains; classroom teachers are assessed in all four domains, including technology integration.. Assessment instruments will vary from district to district or according to setting; however, for samples of assessment instruments see Appendix A

### **Where do the Teacher Technology Competencies fit into the big picture?**

The Teacher Technology Competencies are the outgrowth of a unique consortium of educators, all representing different perspectives but sharing a common goal: the wise use of community resources. Keeping up with the pace of technology isn't simply a matter of upgrading equipment and infrastructure; it also demands a parallel investment in human resources by continually upgrading the knowledge and skills of teachers as they apply the technology in the classroom. Since this issue confronts all types of school districts throughout the state, the competencies have wide applicability as a model.

These competencies are based on the ISTE (International Society for Technology in Education) National Standards and support the TEKS (Texas Essential Knowledge and Skills) for all content areas which require the integration of technology throughout the curriculum.

The Teacher Technology Competencies Committee envisions these competencies as the building blocks of an exemplary system of educational technology that combines pedagogical integrity with real-world relevance, fostering a teaching and learning culture in which the computer is a tool as basic as the three R's. In this culture, teachers will no longer have to struggle to adjust constantly to the rapidly changing technology environment. Rather, as part of a larger user community of professionals, teachers will possess the technical competence that enables them to enjoy the benefits of technology, understand its infinite potential, and look forward to new technological practices and products for improving the quality of students' learning experiences.

# TECHNOLOGY COMPETENCIES FRAMEWORK

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Each of the following relates to Technology Competency Framework Domains, descriptions of the Domains, and a list of Technology Topics which address the Domains. The pages following reflect the competencies related to each topic.

**Domain 1: Basic Technology Operation** - Instructional staff must be able to demonstrate the use of a multimedia computer system with related devices in order to run programs; to access, generate, and manipulate data; and to communicate results.

- 1.1 Basic Operations
- 1.2 Technology Tools

**Domain 2: Personal/Professional Use of Technology Tools** - Instructional staff will apply tools for enhancing their own professional growth and productivity. They will use technology in communicating, collaborating, conducting research, and problem solving.

- 2.1 Word processing
- 2.2 Database
- 2.3 Spreadsheet
- 2.4 Graphics
- 2.5 Multimedia applications
- 2.6 Telecomputing
- 2.7 Teacher/administrative Applications

**Domain 3: Social, Ethical, and Human Issues** - Instructional staff will demonstrate knowledge of equity, ethics, legal, and human issues concerning the use of computers and technology.

- 3.1 District guidelines - ethics / Acceptable Use Policy

**Domain 4: Application of Technology in Instruction** - Instructional staff will apply computers and related technologies to support instruction in their grade level and subject areas. They must plan and deliver instructional units that integrate a variety of software, applications, and learning tools. Lessons developed must reflect effective grouping and assessment strategies for diverse populations.

- 4.1 District vision
- 4.2 Classroom integration

**Domain 1: Basic Technology Operation**

**Topic 1.1: Operating Systems**

**Purpose:** Essential to using any computer is a knowledge of its operating system. Graphical user interfaces (GUIs) allow the user an easier method of working with programs and data files. Whether using MacOS or Windows '95, users need to learn how to organize files, run applications, save and retrieve files, select printers, and operate a mouse.

**Prerequisite/Entry skills:** Minimum keyboarding

**Competencies:**

- Basic operation
  - on/off/reboot
  - mouse maneuvers
  - window parts
  - desktop navigation
  - format disk
- File management
  - saving/save as files
  - retrieving files
  - renaming files
  - copying files
  - creating directories/folders
  - deleting files
  - finding files
  - organize files
  - backup files
- Using online help
- Identify technical support
- Opening applications
- Closing applications
- Network navigation
- Printer setup/selection
- Changing desktop settings
- Install/uninstall software
- Memory management
- Keyboard shortcuts
- Multitasking

**Assessment:**

**Domains I: Basic Technology Operation**

**Topic 1.2: Technology Tools**

**Purpose::** In addition to computers, technology users often have other devices available to them.

To fully utilize the multimedia capability of computers, users need to learn how and when to use the various equipment in conjunction with the computer.

**Prerequisite/**

**Entry skills:** Keyboarding fluency to be productive  
Operating systems  
Introductory

- Word processing
- Graphics

**Competencies:**

- Use **available** hardware tools as stand alone devices or connected to a computer.

*(this is a list of possible tools)*

- CD-ROM
- Video camera
- Projection devices
- VCR
- Videodisc player
- Flatbed scanner
- Digital camera
- Audio digitizers
- Video digitizers
- Printer
- Fax/modem

- Integrate tools into multimedia presentations

**Assessment:**

**Domain 2: Personal/Professional Use of Technology Tools**

**Topic 2.1: Word Processing**

**Purpose:** Word processing is the act of using a computer to compose text, saving the document to a disk, printing the document and then recalling and making changes to the document without completely retyping it. In addition to creating many different kinds of documents, word processing offers many editing and formatting features to give the work a professional appearance. There are different conventions used in producing documents on a computer versus a typewriter. Most word processing programs also contain built-in features such as dictionaries to assist in spell checking and a thesaurus to suggest synonyms and in some cases antonyms.

Teachers use word processors for personal productivity such as creating their lesson plans, memos to other faculty members, and letters to parents.

By using a word processor, the user will be able to create, edit, manipulate, store, and print documents.

**Prerequisite/**

**Entry skills:** Keyboarding fluency to be productive  
Operating systems

**Competencies:**

- Identifying and using available menus, toolbars & palettes
- Entering text
- Formatting/editing text
  - using and setting tabs
  - using alignment tools
  - line spacing
  - setting margins
  - using text styles
  - using cut and paste
  - using drag and drop
  - using undo
- Saving/retrieving documents (File management)
- Printing
- Using spell checkers
- Using templates/stationery
- Using headers and footers
- Inserting date/time/page number
- Inserting graphics
- Importing/exporting documents (file translations)

**Assessment:** Create a document .....

**Domain 2: Personal/Professional Use of Technology Tools**

**Topic 2.2: Graphics**

**Purpose:** The addition of graphics to documents can enhance the communication of concepts, relationships, interactions, and structures.

Teachers can use both draw and paint environments for personal productivity. The draw and paint capacity of various software will allow the teacher to create instructional materials, newsletters, brochures, and fliers with a professional touch.

**Prerequisite/**

**Entry skills:** Keyboarding fluency to be productive  
Operating systems

**Competencies:**

- Identifying and using available menus, toolbars & palettes
- Using clipart/libraries
- Identifying/using graphic tools and palettes
- Creating/using objects/images
  - graphics
  - text
- Manipulating objects/images
  - Sizing/moving object/images
  - Selecting object/images
  - Deleting object/images
  - Copying and pasting object/images
  - Duplicating object/images
  - Grouping objects
  - Locking objects
  - Arranging objects
- Enhancing documents with graphics, for example:
  - word processing
  - spreadsheets
  - databases
  - multimedia

**Assessment:**

## **Domain 2: Personal/Professional Use of Technology Tools**

### **Topic 2.3: Database**

**Purpose:** A database is an electronic method of creating, organizing, manipulating, storing and retrieving information.

A teacher can use a database both for personal productivity and instructional pursuits. Within schools that use computer technology, teachers can take attendance from a database that lists all their students' names, ID numbers, and attendance records for certain time periods. Databases are also used to list student information in case the teachers need to notify parents. Instructionally, databases can be used to organize and analyze information.

#### **Prerequisite/**

**Entry skills:** Keyboarding fluency to be productive  
Operating systems  
Introductory

- word processing
- graphics

#### **Competencies:**

- Identifying and using available menus, toolbars & palettes
- Database terminology
- Database manipulation
  - data entry/add records
  - moving among fields
  - sort records
  - search strategies
  - find records
  - match records
  - Boolean operators (and/or/not)
- Modify a database
  - add fields
  - edit fields
  - delete fields
  - field type
- Create a database
  - determine fields/types
  - enter records
  - design & create simple layouts
- Design and print report
- Create and print mail merge documents

#### **Assessment:**

## **Domain 2: Personal/Professional Use of Technology Tools:**

### **Topic 2.4 Spreadsheet**

**Purpose:** A spreadsheet was originally designed to be the computer's equivalent of an accountant's ledger. However, spreadsheets have developed into powerful tools that organize, manage, and calculate numerical data for many different applications. A spreadsheet uses numbers much like a word processor uses words. Where a word processor enables the author to enter and edit words and paragraphs until a composition is just right, a spreadsheet allows the user to manipulate numbers and formulas to analyze numerical models.

Teachers can use spreadsheets as gradebooks, but they can also use them to organize and graph data, run statistical analyses, and other mathematical applications.

#### **Prerequisite/**

**Entry skills:** Keyboarding fluency to be productive  
Operating systems (1.1)

#### **Competencies:**

- Spreadsheet terminology
- Identifying and using available menus, toolbars & palettes
- Create/modify a spreadsheet
  - enter data
  - add functions & formulas
  - add/delete rows/columns
  - format cells
  - modify cells size
  - move columns/rows
  - edit cell information
  - sort information
  - selecting cells
  - navigating cells
  - split pane
- Create graphs
- Using functions & formulas
- Copy data (Fill right, down)
- Print document
  - Defining print range

#### **Assessment:**

## **Domain 2: Personal/Professional Use of Technology Tools:**

### **Topic 2.5: Multimedia Applications**

**Purpose:** Multimedia applications is a combination of hypermedia and presentation software. These programs allow the user to support a variety of media including text, graphics, video, sound, voice, and animation.

Multimedia applications and presentation software offer different methods of communication from traditional classroom methods. Subject matter is often more interesting and easier to understand when it is presented using a variety of media. Slides, overheads, transparencies, video, and computer graphics, clarify the spoken word, help the audience identify the most important points, and focus attention on the topic at hand.

Hypermedia allows users to present information in a nonlinear fashion, providing a platform for interactive media. It allows teachers and students to customize lessons and create personalized tutorials. Hypermedia can be used to create databases, presentations, and computer aided instruction.

#### **Prerequisite/**

**Entry skills:** Keyboarding fluency to be productive  
Operating systems (1.1)  
Word processing (2.1)  
Graphics (2.2)  
Technology tools (1.2)

#### **Competencies:**

- Understand design considerations
  - storyboard
  - fonts
  - backgrounds
  - navigation
  - audience
- Understand and use hypermedia
  - basic concepts
  - menus
  - paint tools
  - buttons
  - view stacks
  - modify stacks
  - create a simple stack
  - present a stack
- Understand and use presentation applications
  - basic concepts
  - menus
  - draw tools
  - outlining
  - create a simple presentation
  - view presentation
  - modify presentation
  - print handouts
  - present
- Integrate tools into multimedia presentations (?)

#### **Assessment:**

**Domain 2: Personal/Professional Use of Technology Tools:**

**Topic 2.6: Telecomputing**

**Purpose:** Telecomputing involves the use of computers to access information and to communicate and collaborate with others. Telecomputing may have the most comprehensive effect on education of all forms of technology because of its ability to end the isolation that has long been common in educational environments.

Through e-mail, users can communicate within the school, the district, or world-wide, allowing them to share information and ideas and to collaborate with colleagues anywhere.

Using a web browser, users can access global information resources in a variety of formats including text, graphics, video, and audio. Resources now available to schools provide the most comprehensive and up to date information.

**Prerequisite/**

**Entry skills:** Keyboarding fluency to be productive  
Operating systems  
Introductory

- word processing
- graphics
- database

**Competencies:**

- Use e-mail to communicate
  - Address/compose
  - Send/receive
  - Forward/reply
  - Save/archive/purge
  - Print
  - Create address book, lists
  - Attach files
  - Set preferences
  - Issues
    - Mail protocol (netiquette)
    - Privacy
- Subscribe to listserv/newsgroups
- Use a WEB browser
  - locate given URLs
  - navigate links
- create, manage, and share bookmarks
- use search engines
- set preferences
- download and manipulate graphics/files
- Understand instructional issues related to use of WWW
  - effective instructional use
  - evaluation and use of information
  - monitoring student use of the Internet
    - tracking links
    - filtering sites
- Use other protocols
  - FTP
  - Telnet
  - Gopher

**Assessment:**

**Domain 2: Personal/Professional Use of Technology Tools:**

**Topic 2.7: Administrative / Teacher Applications**

**Purpose:** Most districts have applications which collect data concerning student information, financial accounting, human resources, etc. Teachers may need to use the programs which interface with these applications in order to maintain daily attendance and student grades and student portfolios. In some districts, teachers also need to understand the purchasing and budgeting programs in order to enter purchase requisitions and plan department budgets.

**Prerequisite/**

**Entry skills:** Keyboarding fluency to be productive  
Operating systems  
Word processing  
Spreadsheet

**Competencies:**

- Use available classroom management/productivity tools *(this is a list of possible tools)*
  - gradebook
  - attendance
  - portfolio
  - problem generator
  
- Use available district administrative management tools *(this is a list of possible tools)*
  - work orders
  - purchase orders
  - calendar
  - student records
  - collaboration tools

**Assessment:**

**Domain 3: Social, Ethical, and Human Issues:**

**Topic 3.1 District Guidelines**

**Purpose:** The power of technology brings added responsibility to the user. Users must understand the legal ramifications of using electronic information. Digital access makes it easy to violate copyright laws and ignore intellectual property rights; therefore, it is incumbent for any user to understand and agree to regulations governing access to electronic information. In addition to the legal issues, users need to be aware of social and human issues related to the use of technology.

**Prerequisite/**

**Entry skills:** None

**Competencies:**

- Understanding of and compliance with ethical use policies and procedures
  - copyright
  - citing sources
  - piracy
  - privacy
  - rights
  - publishing
  
- Understanding of and compliance with acceptable use of electronic information systems
  - privileges
  - responsibilities
  - regulations
  - permissions

**Assessment:**

**Domain 4: Application of Technology in Instruction:**

**Topic 4.1: District Vision**

**Purpose:** Districts are spending large amounts of money for technology and it is vital that all of district staff are able to articulate the district's purpose in purchasing technology. In addition, district personnel should be familiar with its technology plan.

**Prerequisite/  
Entry skills:** None

**Competencies:**

- Understanding of District's Instructional vision
  
- Understanding of the District's comprehensive technology plan

**Assessment:**

**Domain 4: Application of Technology in Instruction**

**Topic 4.2: Technology Integration**

**Purpose:** The decision to purchase technology for schools and to expect district personnel to demonstrate competency is ultimately based upon the desire to make technology available as an instructional tool within the classroom. Developing competency in the integration and application of technology in the classroom is the primary responsibility of all educators.

**Prerequisite/  
Entry skills:** All the other topics

**Competencies:**

- Demonstrate familiarity with current research on technology use in education
- Demonstrate understanding of the various roles of technology in education
  - personal/professional productivity
  - administrative applications
  - curriculum support
  - student use
- Demonstrate the use of technology as an integral element of instruction
- Demonstrate classroom management techniques in technology-rich environments
- Demonstrate ability to select and evaluate instructional software
- Demonstrate ability to develop and use assessment rubrics

**Assessment:**